

Precision Astrometry and Photometry from Pan-STARRS 1



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thanks to
John Tonry
Doug Finkbeiner

PSF magnitude residuals (i-band, chip XY40)

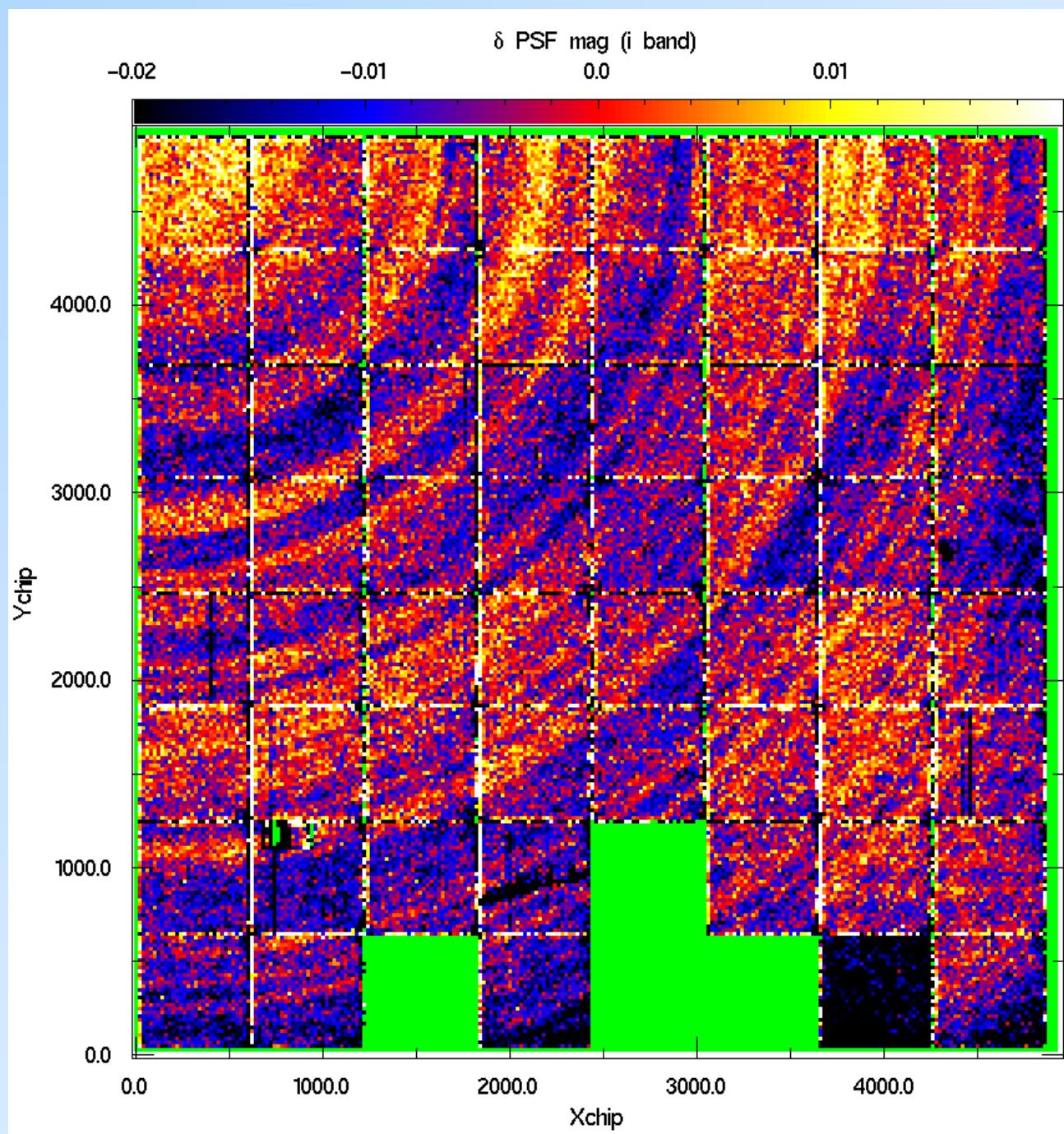
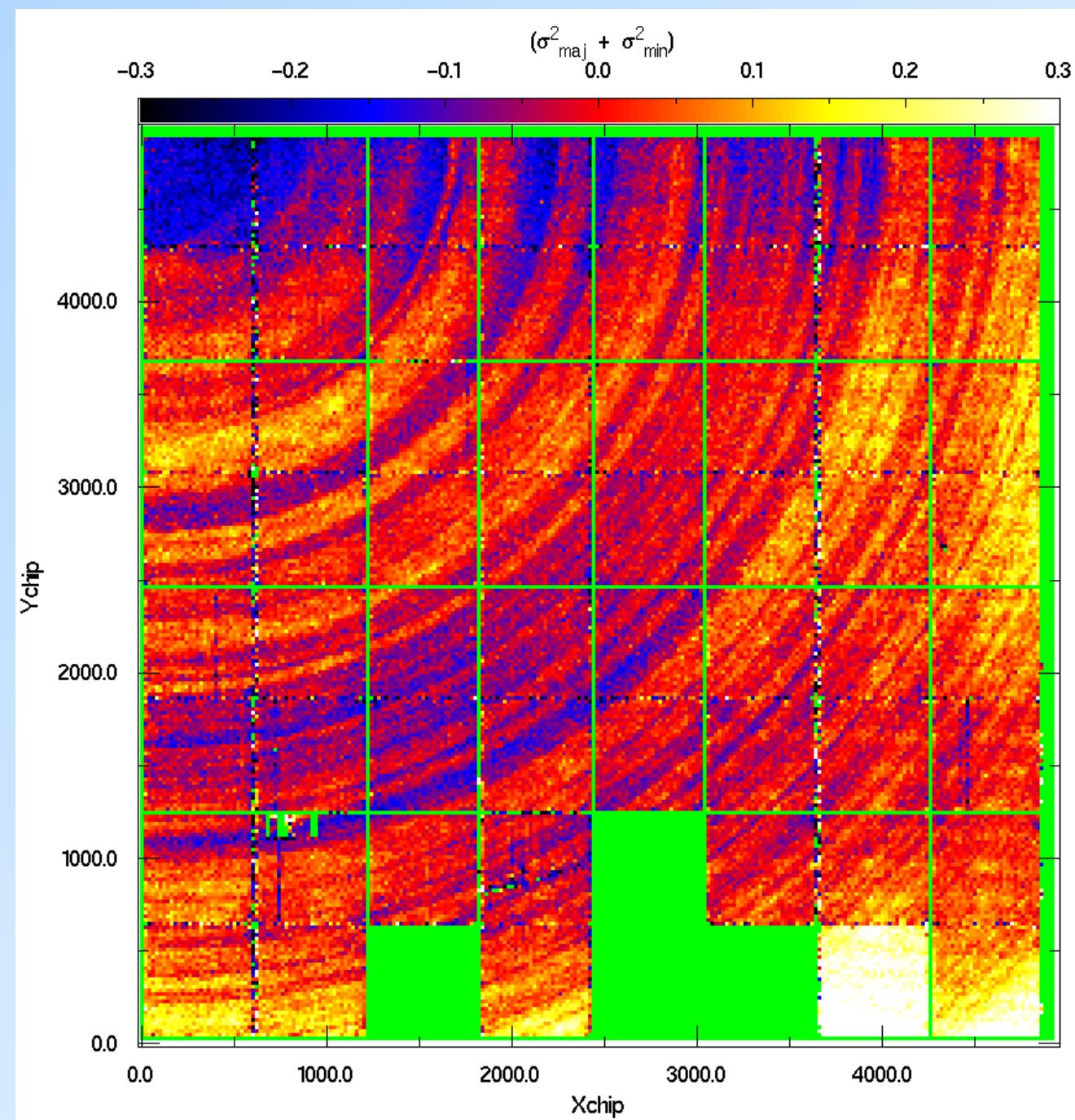
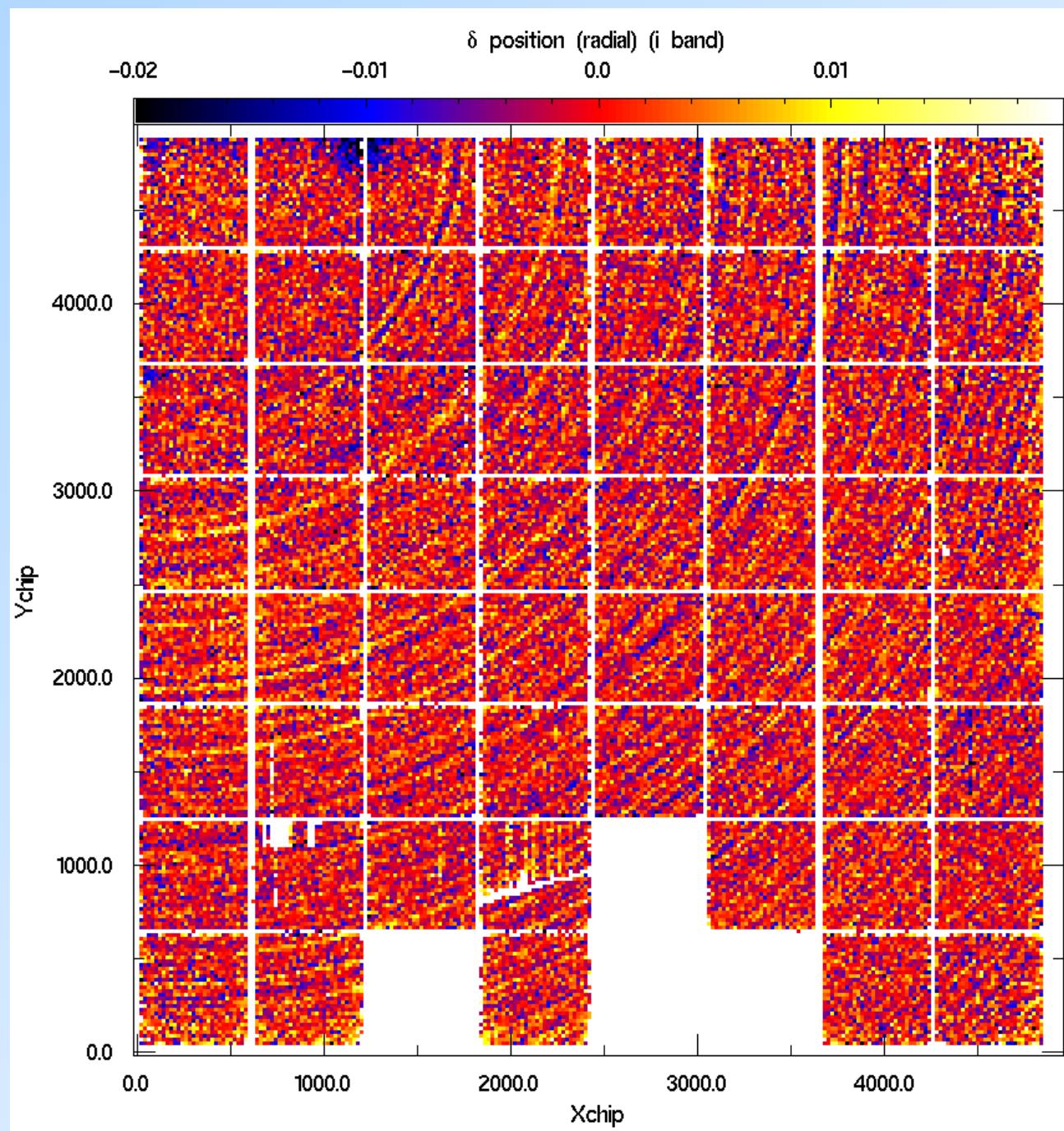


Image Smearing ($\sigma_{\text{major}}^2 + \sigma_{\text{minor}}^2$: i-band, XY40)

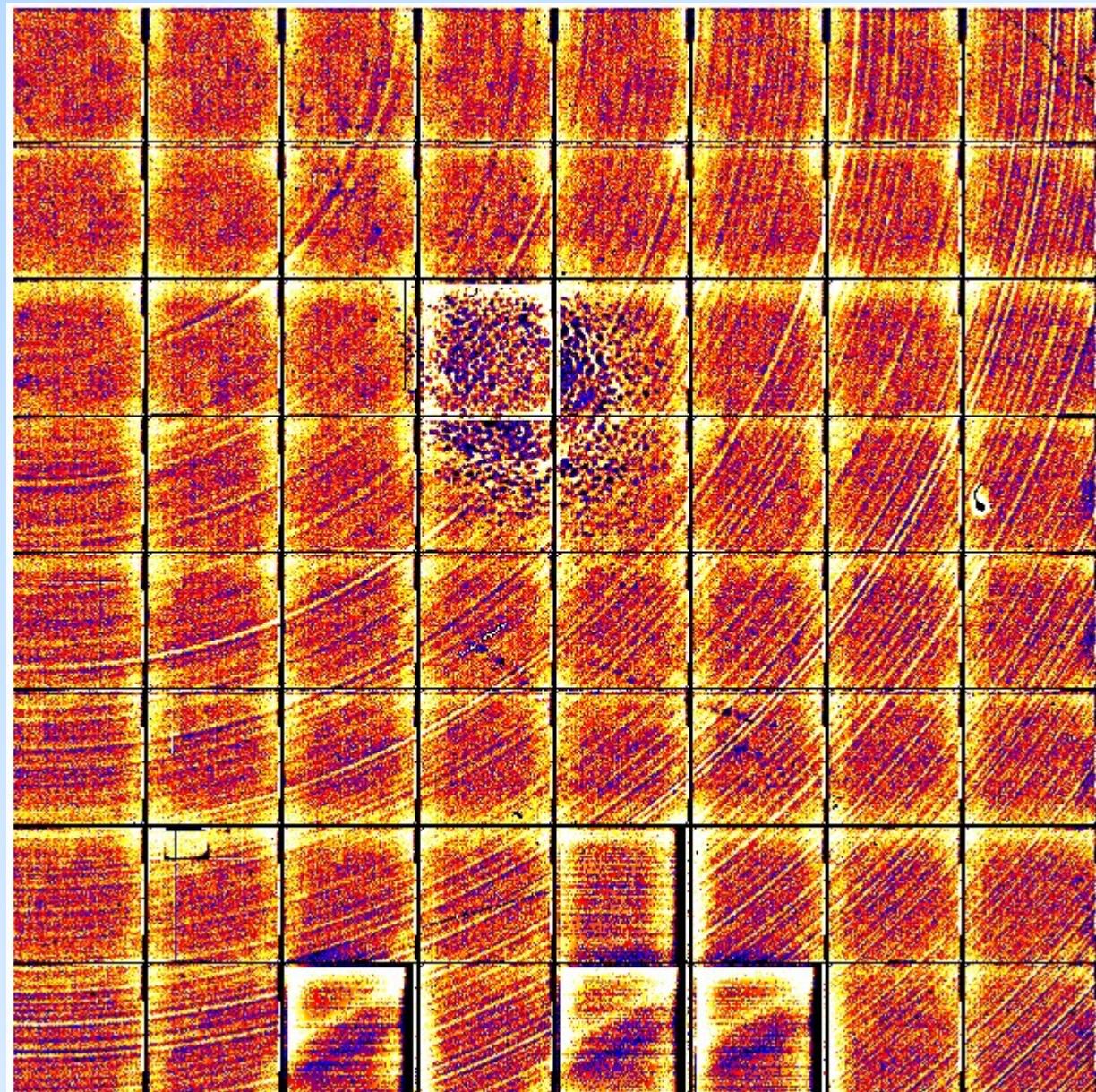


Astrometric Residuals (radial, i-band, XY40)



Flat Field (after high-pass filtering)

monochromatic flat @ 630nm



Aperture magnitude residuals (i-band, XY40)

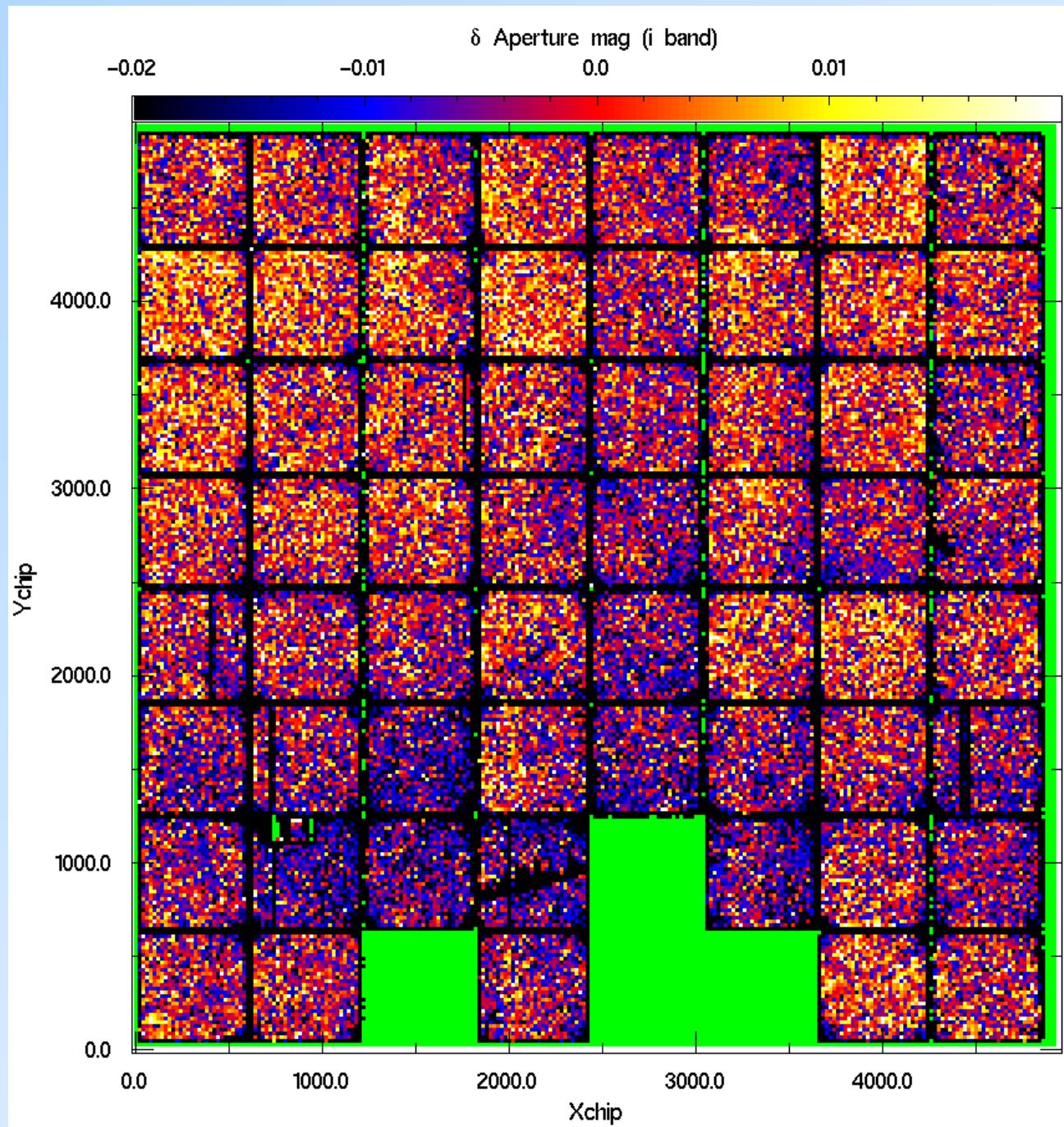
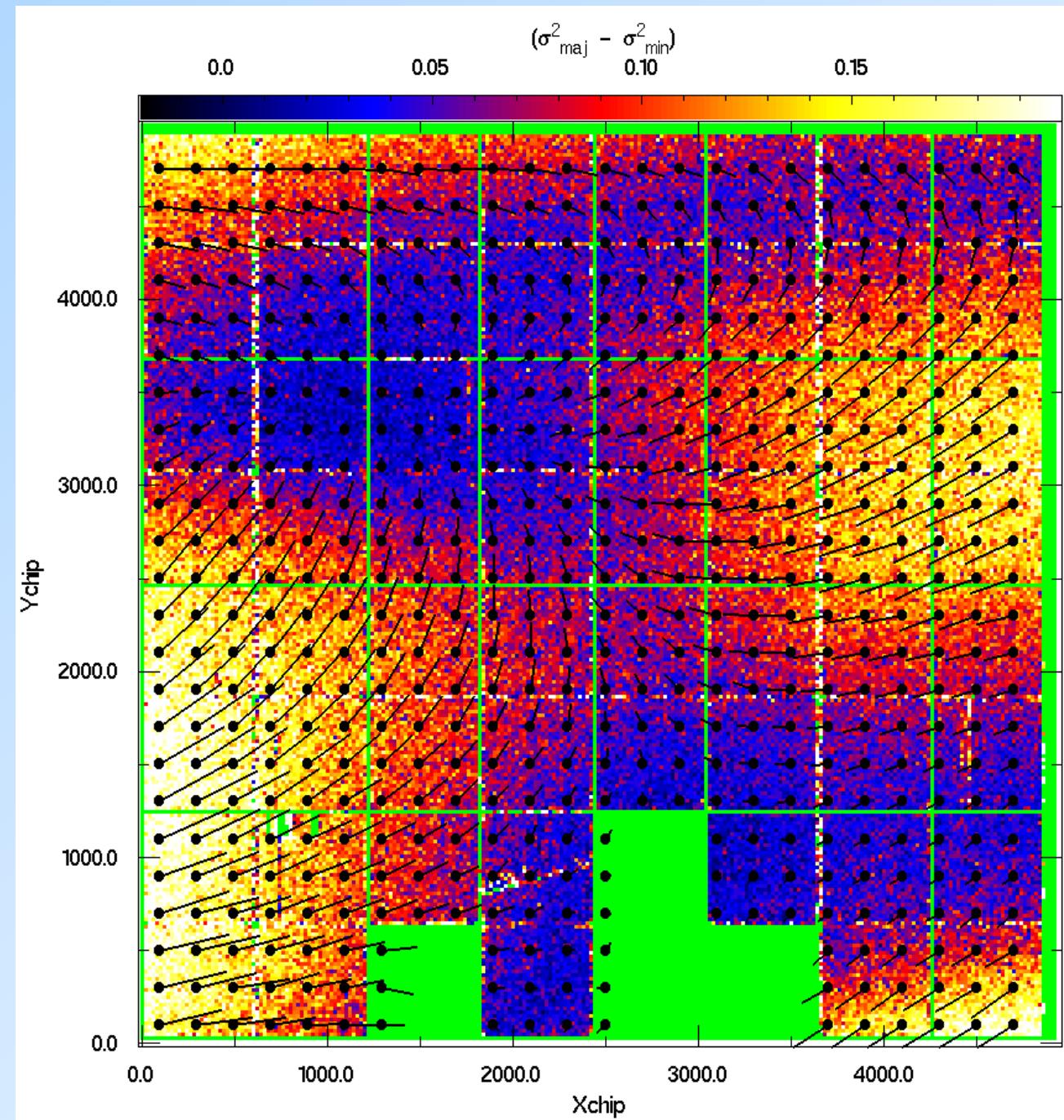
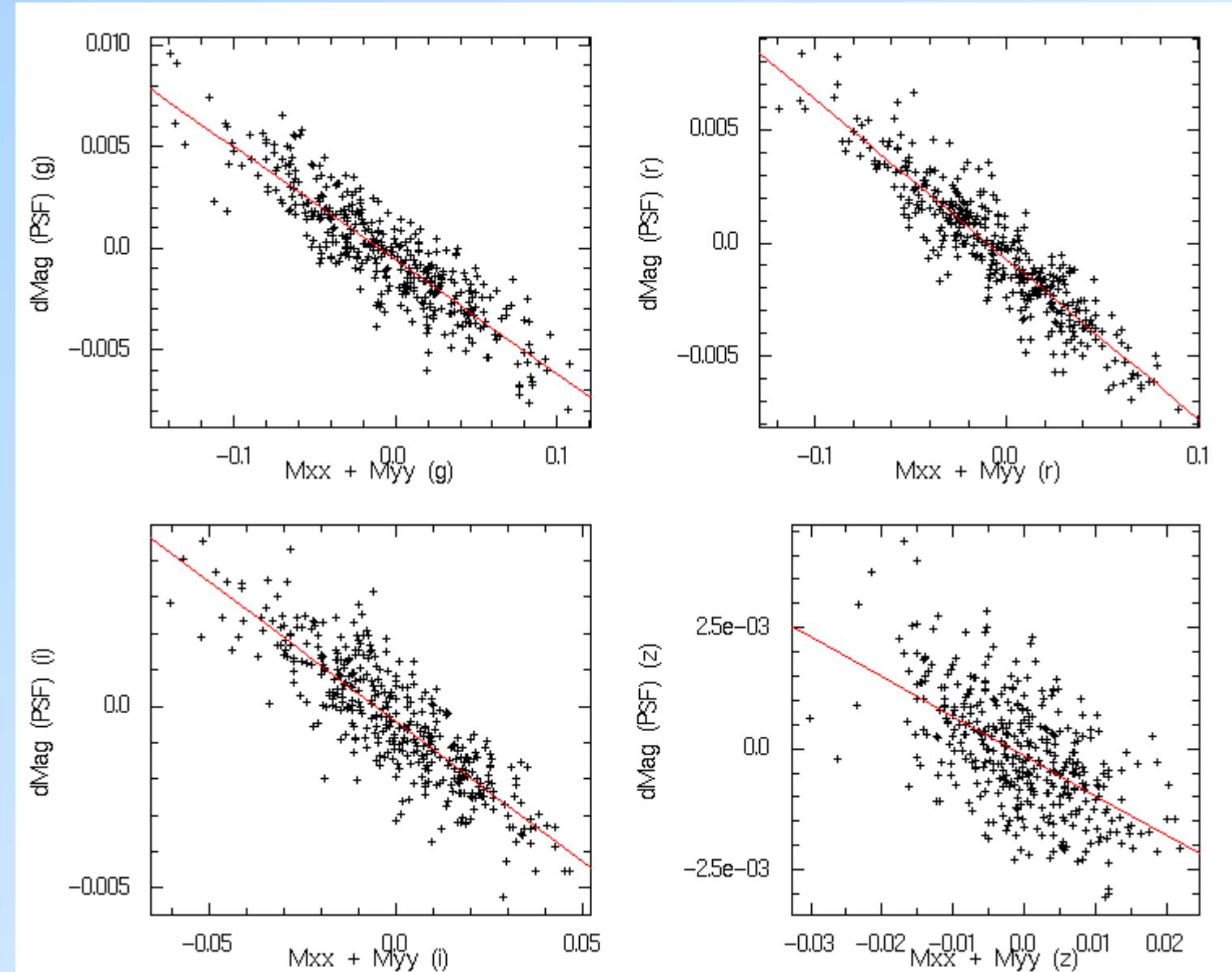


Image Shearing ($\sigma^2_{\text{major}} - \sigma^2_{\text{minor}}$: i-band, XY40)



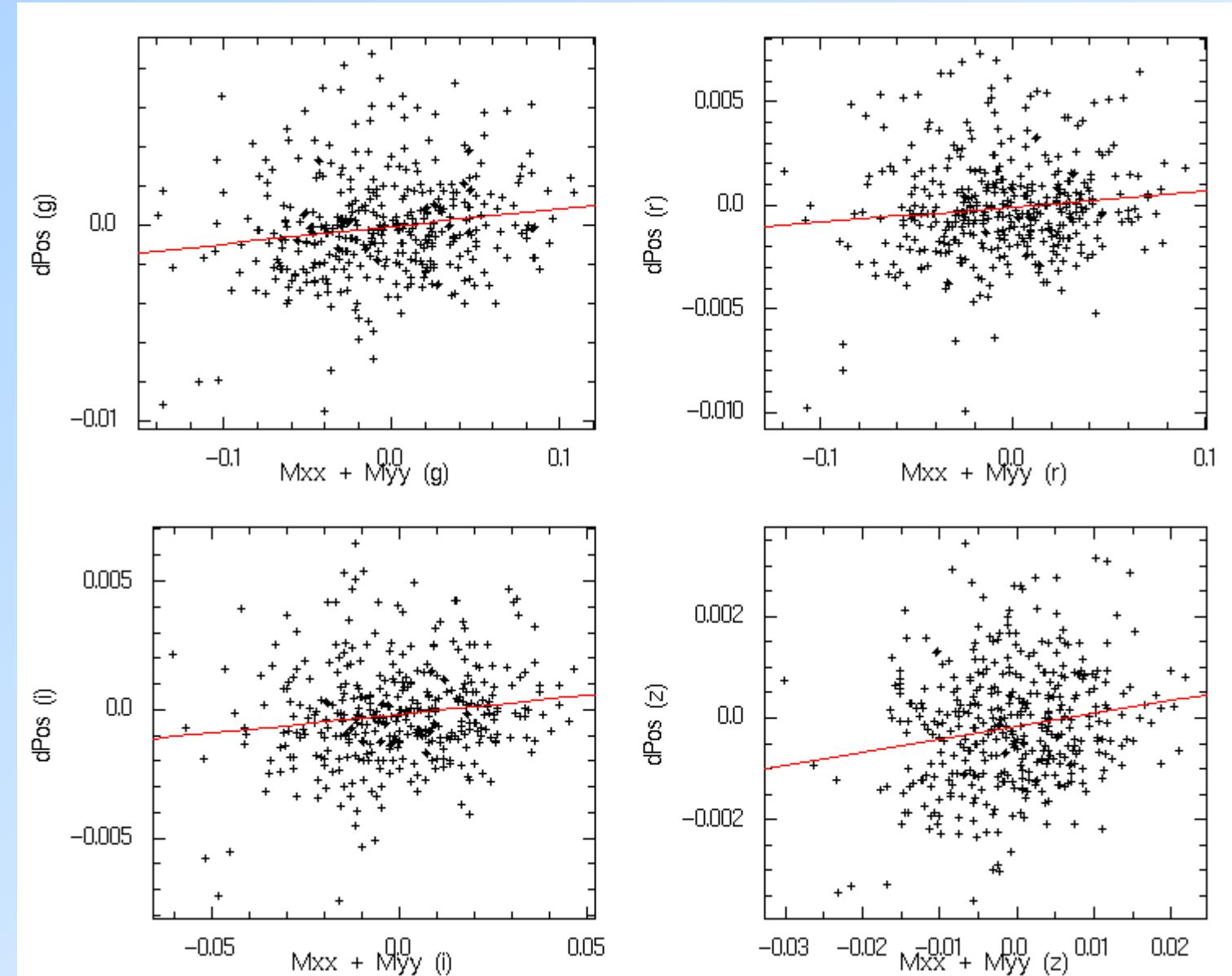
PSF magnitude residuals : correlations between filters

- smear vs psf mag residuals



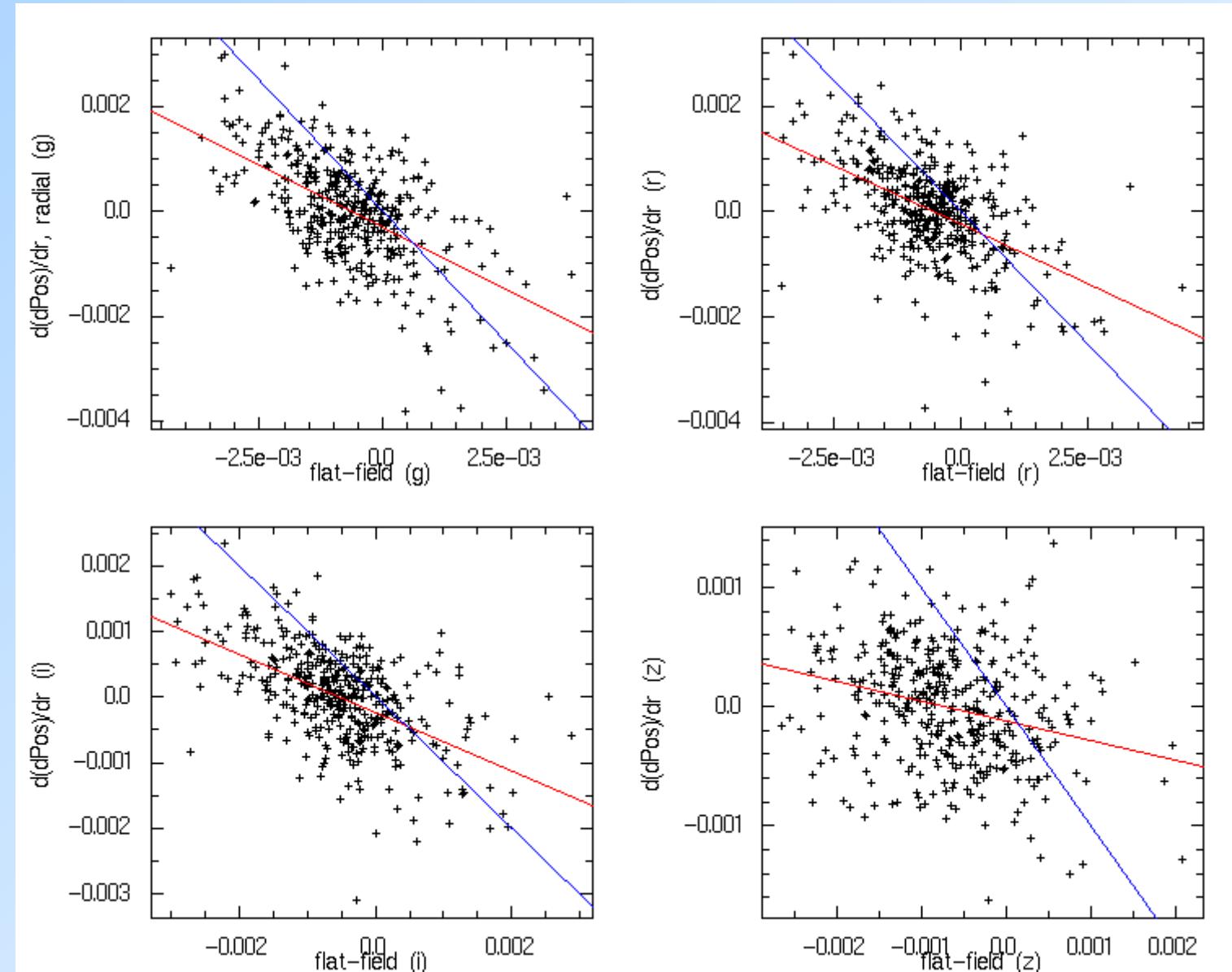
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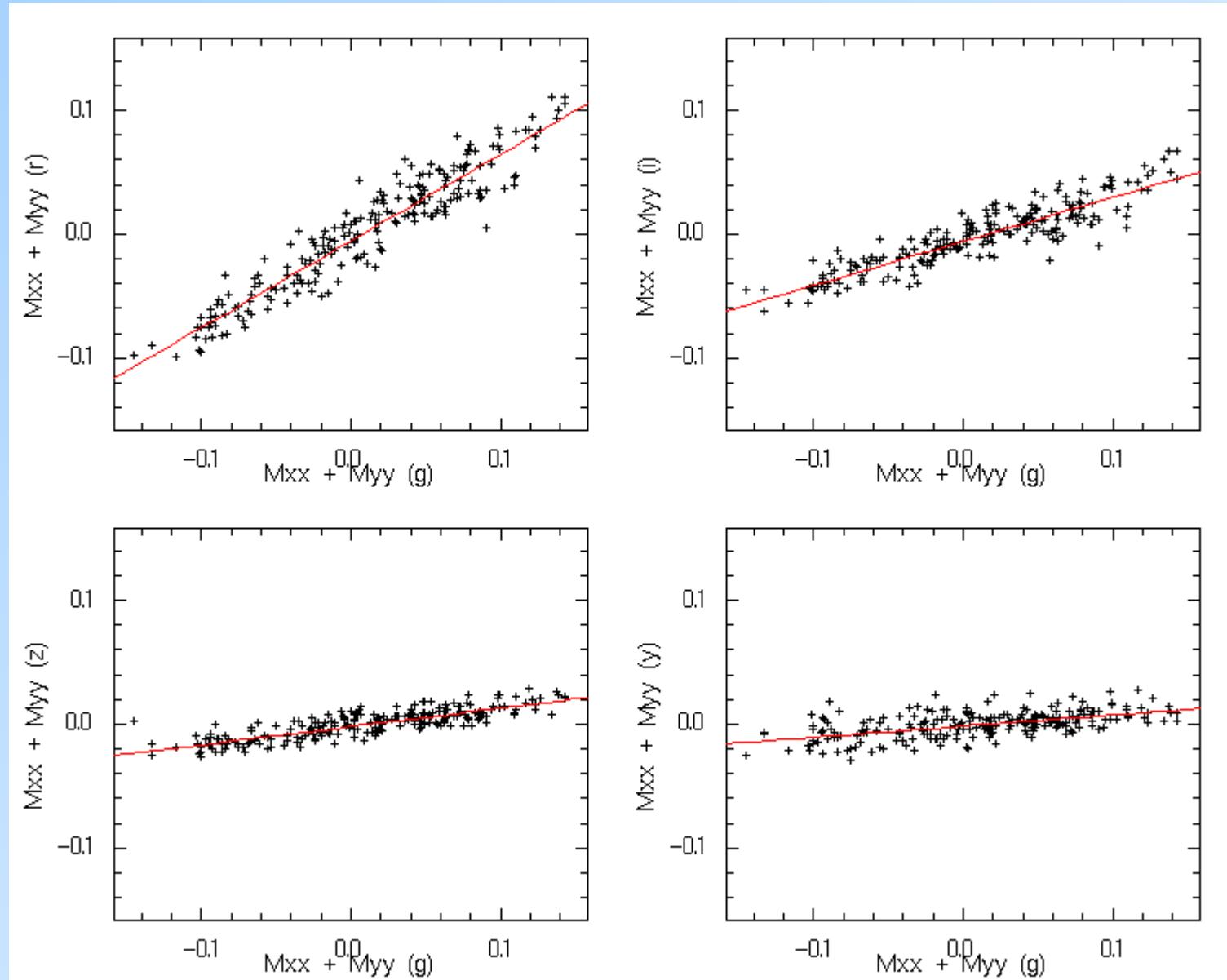


Correlations between systematic trends

- psf photom residual \sim smear ($\sigma_{\text{major}}^2 + \sigma_{\text{minor}}^2$)
- $\partial \text{smear} / \partial \text{radius} \sim \Delta R_{\text{off}}$ (radial component of astrometry residual)
- $\partial \Delta R_{\text{off}} / \partial \text{radius} \sim \Delta \text{flat}$

Filter	psf photom res vs smear	$\partial \text{smear} / \partial \text{radius}$ vs ΔR_{off}	$\partial \Delta R_{\text{off}} / \partial \text{radius}$ vs Δflat
g_{P1}	-0.056	-0.066	-0.47
r_{P1}	-0.071	-0.073	-0.45
i_{P1}	-0.077	-0.095	-0.45
z_{P1}	-0.082	-0.078	-0.17

Image Smearing : correlations between filters



Correlations between filters

- trend in filter vs g_{P1}
- y_{P1} is dominated by fringes

Filter	Δ mag	smear	ΔR_{off}	Δ flat
r_{P1}	0.84	0.78	0.84	0.76
i_{P1}	0.50	0.40	0.66	0.64
z_{P1}	0.26	0.16	0.37	0.33
y_{P1}	0.10	0.10	0.25	0.30